

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the reasons that follow. Claims 26-40 remain pending in this application.

Applicant thanks the Examiner for withdrawing the rejection under 35 U.S.C. 102 after the arguments made in the pre-appeal brief.

Claim Rejections - 35 USC § 103

Claims 26, 28-31, 33-36, and 38-39

On page 2 of the Office Action, Claims 26, 28-31, 33-36, and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Sako et al.* (US 2001/0004279) in view of Japanese Patent Document (JP 09-015575). Applicant respectfully traverses the rejection. Independent Claim 26 recites:

26. A display device comprising:
a substrate layer comprising substantially transparent material;
a pinhole mask comprising an array of pinholes, wherein each pinhole of the array of pinholes is associated with a pixel of the display device; and
an array of electrically controllable lenses positioned between the substrate layer and the pinhole mask to control the divergence of light received through the substrate and the lenses towards the pinhole mask, wherein the light is focused into a pinhole by a lens of the array of electrically controllable lenses to illuminate the associated pixel and is transmitted unfocused by the lens to darken the associated pixel.

(emphasis added.)

1. The combination of *Sako* and JP-09-015575 fails to disclose an "array of electrically controllable lenses."

Independent Claim 26 recites, in part, "an array of electrically controllable lenses." (Emphasis added). Independent Claim 33, although different in scope, recites a similar element. On page 2 of the Office Action, the Examiner asserts that "an array of electrically

controllable lenses" is disclosed by the feature shown by reference numerals "104a+104b+105" of *Sako*. Applicant respectfully disagrees and submits that the Examiner misconstrues the plain language of the claims.

Reference numerals "104a+104b+105" of *Sako* refer to "upper electrodes 104a," "lower electrodes 104b" and "liquid crystal layer 105." In column 5, lines 10-45, *Sako* describes these components as follows:

A reflection-type liquid crystal display device 1 includes a transparent upper substrate 103 having serrated protruding portions thereon and a transparent flat lower substrate 106. The upper substrate 103 has transparent upper electrodes 104a arranged on the protruding portions and the lower substrate 106 has transparent lower electrodes 104b crossing the upper electrodes 104a so that crossing parts of electrodes 104a and 104b define pixels P (FIG. 9). Each protruding portion of the upper substrate 103 has a surface downwardly inclined to define a prism. The lower substrate 106 has light reflection portions 107 and light absorption portions 108 on its lower surface. A liquid crystal layer 105 is sandwiched between the upper substrate 103 and the lower substrate 106.

Upon switching on or off of an electric field applied to the liquid crystal layer 105, liquid crystal molecules in the liquid crystal layer 105 are changed between a state in which the liquid crystal molecules are aligned perpendicular to the lower substrate 106 and a state in which the liquid crystal molecules are aligned parallel to the lower substrate 106.

Here, it is assumed that a refractive index n_g of the substrates 103, 106 and a refractive index n_o of the liquid crystal in the molecule short axis direction agree with each other and a refractive index n_e of the liquid crystal in the molecule long axis direction satisfies $n_e > n_o$.

When the liquid crystal molecules are aligned perpendicular to the lower substrate 106, light incident on the upper substrate 103 goes straight on as shown by numeral 109 and is reflected by the light reflection portions 107 and then goes outside the display device 1 through the upper substrate 103.

On the other hand, when the liquid crystal molecules are aligned parallel to the lower substrate 106, the light is deflected through the upper and lower substrates having the refractive index n_g and the liquid crystal layer having the refractive index

$(n_e+n_o)/2$ as indicated by an optical path 110. Then, the light goes to the light absorption portion 108 so that the light is absorbed and not irradiated to the outside.

(Emphasis added).

As such, *Sako* discloses a display device having a liquid crystal layer. Depending on an applied electric field, molecules of the liquid crystal layer are aligned either perpendicular to or parallel to a lower substrate. When the molecules are aligned perpendicular to the lower substrate, light is allowed to freely pass through the liquid crystal layer. When the molecules are aligned parallel to the lower substrate, light is refracted or deflected so that it is absorbed by an absorption portion of the display device. As such, the liquid crystal layer of *Sako*, merely changes its refractive index to either allow the light to pass through the layer undisturbed or to deflect the light to an absorption portion.

A lens is a device that either converges light to or diverges light from a focal point. When the light is allowed to pass undisturbed through the liquid crystal layer of *Sako*, there is certainly no convergence or divergence of the light to or from a focal point. Similarly, when the light is deflected due to the altered refractive index of the liquid crystal layer, the light again does not converge to or diverge from a focal point. The uniform refractive index of the liquid crystal layer causes all of the light to uniformly deflect. Accordingly, the liquid crystal layer of *Sako* does not cause light to converge to or diverge from a focal point. Thus, the liquid crystal layer of *Sako* is not the same as a “lens,” as recited in Claims 26 and 33.

The “upper electrodes 104a” and “lower electrodes 104b” are not the claimed “an array of electrically controllable lenses” either. Like the “liquid crystal layer 105” of *Sako*, “upper electrodes 104a” and “lower electrodes 104b” do not converge light to or diverge light from a focal point. Thus, contrary to the Examiner’s assertion, the claimed “an array of electrically controllable lenses” is not disclosed by reference numerals “104a+104b+105” of *Sako*.

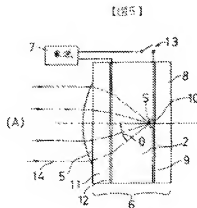
JP 09-015575 fails to cure the deficiencies of *Sako* with respect to “an array of electrically controllable lenses.” JP 09-015575 also fails to disclose, teach, or suggest “an array of electrically controllable lenses.” (Emphasis added). On pages 2-3 of the Office

Action, the Examiner states that JP 09-015575 discloses a “liquid crystal display device ... that uses a lens (6) that focuses the light (14) into the pinhole (10) of the mask (9).” As such, the Examiner analogized the element “6” from JP 09-015575 to an “electrically controllable lens” as in Claim 26. Applicant respectfully disagrees and respectfully submits that the Examiner mischaracterizes the element “6” of JP 09-015575.

The Abstract of JP 09-015575 states, in part (with emphasis added):

A liquid crystal layer 2 is interposed in between one pair of substrate member having transparent electrodes 9, 12 and a condenser lens 5 is arranged at a side opposite to the liquid crystal layer 2 of the substrate member.... In a state in which an electric field is not impressed on the liquid crystal layer 2, a light shielding layer being at the vicinity of a light convergent point where a light made incident from the condenser lens 5 is converged and having a size which is almost equal to the irradiation area of the converged light is arranged.... When the electric field is impressed on the liquid crystal layer 2, since the refractive index of liquid crystal is changed and the light convergent point is moved, the incident light is emitted from a part other than the shielding layer to become a bright (white) state.

Fig. 5 of JP 09-015575 is reproduced below:



As disclosed above in the Abstract and Fig. 5 of JP 09-015575, the light 14 is converged by “condenser lens 5.” However, condenser lens 5 is not “electrically

controllable.” Indeed, the Examiner does not rely on condenser lens 5 to disclose an “electrically controllable lens.”

Instead, the Examiner analogizes element 6 of JP 09-015575 to an “electrically controllable lens.” The Abstract of JP 09-015575 fails to explicitly mention element 6, but Fig. 5 appears to disclose that element 6 consists of “transparent electrodes 9 and 12” and “liquid crystal layer 2.” Applicant respectfully submits that transparent electrodes 9 and 12 and liquid crystal layer 2 do not form a “lens” (as apparently asserted by the Examiner).

As discussed above, a lens is a device that either converges light to or diverges light from a focal point. JP 09-015575 discloses that condenser lens 5 causes the light 14 to converge to a convergence point. JP 09-015575 further discloses that an electric field applied to the liquid crystal layer 2 changes the refractive index of the liquid crystal to move the convergence point. Changing the refractive index does not itself focus or converge the light to a convergence point. The change of the refractive index of the liquid crystal layer 2 merely causes the convergence point created by condenser lens 5 to be moved. Liquid crystal layer 2 and transparent electrodes 9 and 12 are not responsible for the actual convergence or “focusing” of the light (which is instead performed by condenser lens 5). Passing light through a medium that has a different refractive index (e.g., the liquid crystal layer 2) is not the same as converging light to or diverging light from a focal point. Accordingly, the liquid crystal layer 2 in combination with transparent electrodes 9 and 12 of JP 09-015575 is not a “lens,” as recited in Claims 26 and 33.

For at least the reasons discussed above, Applicant respectfully submits that *Sako* and JP 09-015575, alone or in combination, fail to disclose, teach, or suggest an “electrically controllable lens,” as recited in Claims 26 and 33. Accordingly, the rejection is improper and withdrawal of the rejection is respectfully requested.

2. The combination of *Sako* and JP-09-015575 fails to disclose that “light is focused into a pinhole ... to illuminate the associated pixel and is transmitted unfocused by the lens to darken the associated pixel.”

On page 2 of the Office Action, the Examiner acknowledges that “Sako et al. do not specifically teach the light being focused into the pinhole, only show the light being deflected

towards and into the pinholes.” However, the Examiner points to JP 09-015575 as showing this feature. Specifically, the Examiner asserts that the Abstract and Fig. 5 of JP 09-015575 disclose a lens (6) that focuses light (14) into a pinhole (10) of a mask (9).

First, the element at reference number (10) does not appear to be a “pinhole.” Reference number (10) points to a rectangular structure that appears to absorb the converged light, not an aperture in a solid structure. For example, the Abstract of JP 09-015575 states that “when the electric field is not impressed on the liquid crystal layer 2, the incident light is converged and is absorbed by the shielding layer to become a dark (black) state.” (Emphasis added).

Second, the Examiner appears to analogize the “transparent electrode 9” of JP 09-015575 to the “mask” recited in Claim 26. Applicant respectfully submits that a “transparent electrode 9” is not the same as a “mask.” A “mask” blocks out or absorbs at least a portion of the light. However, transparent electrode 9 freely allows light to pass through it due to its transparency. As such, transparent electrode 9 actually has an opposite functionality to that of a “mask,” as recited in Claims 26 and 33.

Finally, JP 09-015575 appears to disclose that the light is converged to a convergence point to cause a “dark state” and that the light is emitted away from the convergence point to cause a “bright state.” In contrast, Claim 26 recites that “light is focused into a pinhole ... to illuminate the associated pixel and is transmitted unfocused by the lens to darken the associated pixel.” *Sako* discloses that “targets to be irradiated with light are changed between light transmission portions 117 and light absorption portions 118 by applying an electric field to the liquid crystal layer 105.” If *Sako* were modified (as suggested by the Examiner) to include the teachings of JP 09-015575, the focusing of the light would darken the associated pixel, and would not “illuminate the associated pixel,” as recited in Claims 26 and 33. As such, the combination of *Sako* and JP 09-015575 would not disclose, teach, or suggest “light is focused into a pinhole ... to illuminate the associated pixel and is transmitted unfocused by the lens to darken the associated pixel,” as recited in Claim 26, or similar elements recited in Claim 33.

For at least the reasons discussed above, the combination of *Sako* and JP 09-015575 fails to disclose, teach, or suggest each and every element of independent Claims 26 or 33. As such, the rejection of Claims 26, 28-31, 33-36, and 38-39 cannot be properly maintained. Applicant respectfully requests withdrawal of the rejection of Claims 26, 28-31, 33-36, and 38-39.

Claims 27 and 37

On page 5 of the Office Action, Claims 27 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Sako et al.* in view of JP 09-015575 and further in view of *Engle* (US 5,623,361). Applicant respectfully traverses the rejection.

On page 5 of the Office Action, the Examiner acknowledges that “Sako et al. do not specifically teach the electrically controllable lenses are based on the use of electrically deformable viscoelastic gel.” To provide these missing features, the Examiner points to *Engle*. However, the combination of *Engle* with *Sako* and JP09-015575 fails to show “an array of electrically controllable lenses” recited in Claims 26 and 33. Claim 27 depends from Claim 26. Claim 37 depends from Claim 33.

For at least the foregoing reasons, the combination of *Engle* with *Sako* and JP09-015575 fails to show all of the elements of Claims 27 and 37. As such, the rejection is not proper. Withdrawal of the rejection is respectfully requested.

Claims 32 and 40

On page 6 of the Office Action, Claims 32 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Sako et al.* in view of JP 09-015575 and further in view of *Do et al.* (US 5,608,554). Applicant respectfully traverses the rejection.

On page 6 of the Office Action, the Examiner acknowledges that Sako et al. do not specifically teach “the use of phosphors.” To provide these missing features, the Examiner points to *Do et al.* However, the combination of *Do et al.* with *Sako* and JP09-015575 fails to show “an array of electrically controllable lenses” recited in Claims 26 and 33. Claim 32 depends from Claim 26. Claim 40 depends from Claim 33.

For at least the foregoing reasons, the combination of *Do et al.* with *Sako* and JP09-015575 fails to show all of the elements of Claims 32 and 40. As such, the rejection is not proper. Withdrawal of the rejection is respectfully requested.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date: March 1, 2010

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